

(19) BUNDESREPUBLIK

DEUTSCHLAND



DEUTSCHES  
PATENTAMT

(12) **Patentschrift**  
(10) DE 196 42 234 C 1

(5) Int. Cl. 6.

A 61 M 5/175

G 05 D 7/00

// A61M 5/148, H01L

49/00, 21/306

- (21) Aktenzeichen: 196 42 234.5-35  
(22) Anmeldetag: 12. 10. 96  
(23) Offenlegungstag: -  
(45) Veröffentlichungstag  
der Patenterteilung: 30. 4. 98

Innerhalb von 3 Monaten nach Veröffentlichung der Erteilung kann Einspruch erhoben werden

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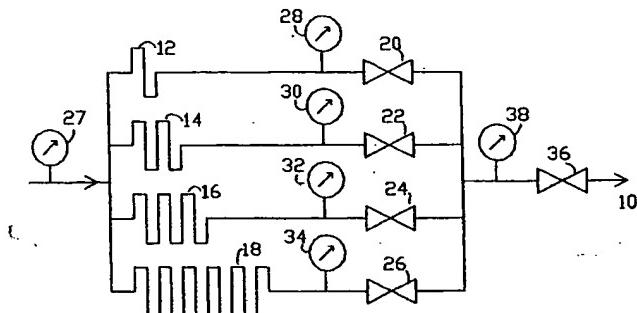
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(56) Für die Beurteilung der Patentfähigkeit in Betracht  
gezogene Druckschriften:

DE 1 95 15 722 C1  
DE 28 55 713 A1  
US 53 18 515

(54) Implantierbare Infusionspumpe

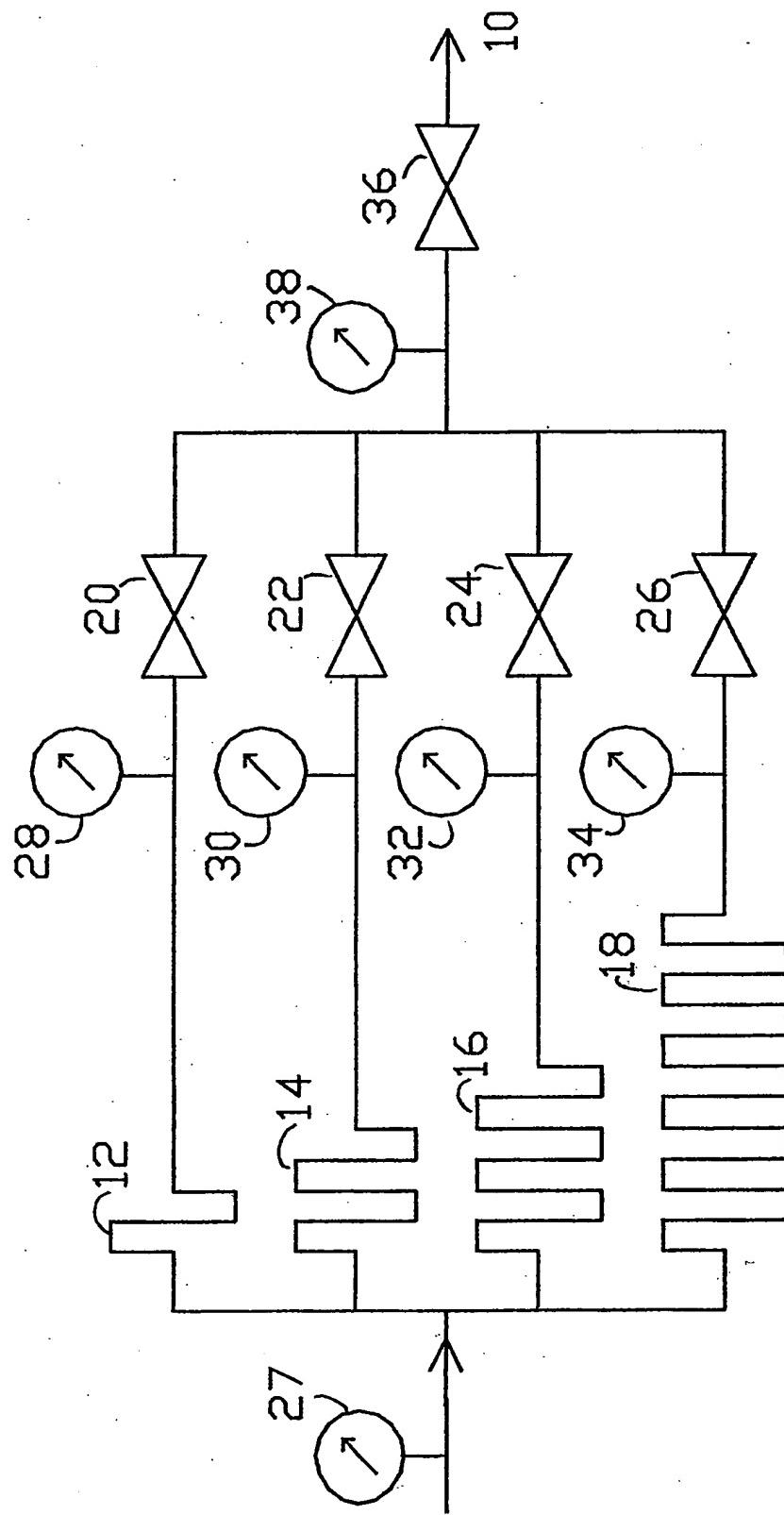
(55) Implantierbare Infusionspumpe mit einem ein Treibmittel aufnehmenden Raum, einem ein Arzneimittel aufnehmenden Raum, einem Anschluß (10) für ein Katheter und einer Mehrzahl von auf ihrer einen Seite mit dem Treibmittelaum und auf ihrer anderen Seite mit dem Katheteranschluß (10) verbundenen Drosselstrecken (12, 14, 16, 18), bei der zwischen den einzelnen Drosselstrecken (12, 14, 16, 18) und dem Katheteranschluß (10) von außen stellbare Ventilen (20, 22, 24, 26) und zwischen den Drosselstrecken (12, 14, 16, 18) und den Ventilen (20, 22, 24, 26) von außen abfragbare Druckmeßeinrichtungen (28, 30, 32, 34) angeordnet sind.



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53.72563

Translation of DE 196 42 234

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### Implantable Infusion Pump

The invention relates to an implantable infusion pump having the characteristics of the preamble of claim 1, which is implanted in the patients who have continuous  
10 need to be supplied with medication, e.g. for pain and spasticity.

The infusion pump known from DE 195 15 722 C1 has several restriction paths formed as a recess edged into  
15 a chip and the 'active' paths are selected by selection of the connection of the chip wherein the desired path is connected. It is not possible to change the flow rate afterwards.

20 DE-OS 28 55 713 teaches a device in which several infusion reservoirs can be connected together from outside by a controllable valve. US 5 318 515 discloses an external infusion pump in which several parallel paths can be individually opened via valves.

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The aim of the present invention is to provide an implantable infusion pump in which the flow rates, changed externally after implantation, can be sensed externally.

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In accordance with the invention this objective is achieved by the characterising part of claim 1. The dependent claims describe preferred embodiments of this infusion pump.

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The invention will be further described with reference to the drawing. The single drawing shows a schematic

view of the restriction paths, the valves and the pressure measuring device connected between the valves.

5       The infusion pump, which is not shown in its entirety, has a housing which receives a bellows in which a drive means which generates a steam pressure is filled. The remaining space receives the medication to be dispensed to the patient.

10      A chip shown schematically in the drawings has four restriction paths 12, 14, 16, 18 of different length formed by edging fluid tracks, the inputs of the paths being connected to the medication reservoir such that the medication is provided at the inputs to the paths  
15      12, 14, 16, 18 with a pressure determined by the pressure of the drive means. Pressure measuring devices 28, 30, 32, 34 are provided at the outputs of the paths 12, 14, 16, 18, and these sense the pressure at the respective outputs and are interrogated by external  
20      devices, which are not the subject of this invention.

Valves, 20, 22, 24, 26 are provided after the pressure measuring devices 28, 30, 32, 34 in the flow direction and these can be switched by external devices which are  
25      not the subject of this invention.

30      A further valve 36 is provided between the point at which the outputs of the valves 20, 22, 24, 26 come together and the catheter connection, and a further pressure measuring device 38 is connected to this.

35      The parallel connection of the restriction paths 12, 14, 16, 18 between the medication reservoir and the catheter connector 10, and the presence of the valves 20, 22, 24, 26, allows the flow rate to be changed after implantation by corresponding switching of the valves.

- Because of high safety demands, it is necessary that the actual position of the valves can be sensed and interrogated externally. This objective is achieved by the provision of the pressure measuring devices 28, 30, 32, 34. In the open position of the valve connected to a pressure measuring device, the pressure corresponds to the pressure at the catheter connector (a essentially atmospheric pressure), whereas the pressure in the corresponding restriction path drops, in the closed position, to the drive means pressure and there is no drop in pressure due to a faulty flow (i.e. the pressure is in the order of 2 bar). Accordingly, the additional pressure measuring device 38 connected to the valve 36 which serves as a safety valve, measures the pressure at the catheter connector when the valve is open and measures the drive means pressure when the valve 36 is closed if at least one of the valves 20, 22, 24 and 26 is open.
- The provision of a further pressure measuring device 27 in the restriction paths 12, 14, 16, 18 enables measurement of the pressure applied at the start of the restriction paths and thus provides an indication of the actual pressure drop across the path.

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